The Valley Group, Inc.

CAT-1™ Transmission Line Monitoring Systems

May 5, 2004

Commissioner John L. Geesman
California Energy Commission
1516 9th Street, MS 43
Sacramento, CA 95814-5512

RE: 03-IEP-01 - 2004 Transmission Update Workshop

Dear Commissioner Geesman,

We wish to commend the CEC on its leadership role in exploring all facets of renewable energy, especially wind resource development and related transmission system issues. The Valley Group has been involved with numerous studies relating to wind farm transmission access, and is directly involved with several IEEE and CIGRE task force initiatives related to wind as it specifically relates to transmission line capacity. We are pleased to have this opportunity to share our findings with the commission.

With regard to the workshop questions posed on physical limits of existing transmission facilities and methods to facilitate access to renewable resources, we wish to call your attention to some actual results observed at a utility in the southwest U.S. using Dynamic Line Rating technology to optimize access to wind farm energy production while ensuring transmission grid reliability, all at minimal cost to the utility and its ratepayers. The bottom line is that Dynamic Line Rating technology enables transmission system operators to utilize the natural correlation that exists between wind farm output and real (not assumed) transmission line capacity. This is not theorized, but rather has been proven and successfully implemented.

We strongly recommend that CEC and CPUC take the time to fully understand Dynamic Line Rating technology, both its capabilities and its limitations, so as to properly consider it as one possible solution to transmission access, and how its benefits can be factored in to bid evaluations when considering transmission upgrade costs.

Background

The DOE has called for 10,000 megawatts of wind generation by 2010 (www.eren.doe.gov), and the Senate has passed a Renewable Portfolio Standard (RPS) that would require utilities to acquire 1% of their power from non-hydro renewable sources by 2005 and 10% by 2010. Transmission "constraints", however, pose a real deterrent for generators to connect to the grid for wind generation or other renewable sources.

Some of the primary drawbacks of wind generation are detailed in the DOE "Wind Energy Program" Government Guide (at www.governmentguide.com):

The Valley Group, Inc. 871 Ethan Allen Hwy. #104 Ridgefield, CT 06877 USA
Phone: (203) 431-0262 E-mail: info@cat-1.com Fax: (203) 431-0296

- "Good wind sites are often located in remote locations far from areas of electric power demand (such as cities)"
- "Wind is intermittent and it does not always blow when electricity is needed"

The first issue highlights the need for adequate transmission infrastructure, while the second makes it all the more difficult to justify such capital investment. Why pay to build transmission lines to deliver capacity that is only intermittently useful? Yet both of these issues can be resolved when transmission access for wind generation is coupled with dynamic, real time rating and monitoring of transmission lines.

Dynamic Line Rating Technology

Dynamic Line Rating systems for overhead transmission lines, sometimes called "real-time rating" systems, measure the exact transfer capacity of a transmission line at all times. In the absence of monitoring, utilities are forced to set line ratings based on unfavorable (conservative) weather assumptions - high ambient temperature, low winds, full sunlight - conditions that cause the line to heat and sag more.

Dynamic Line Rating systems take the guesswork out of ratings and can provide up to 30% or more additional transfer capacity 95-99% of the time. This additional capacity, though not available 100% of the time, tends to be mostly available during the middle of the day when average wind speeds are highest, and so to is the demand for transmission capacity. In addition, it can be very useful in helping system operators deal with contingency events, as the likelihood of additional capacity being available on the rare occasion of a contingency occurring is quite high. Of most immediate relevance is the natural synergy of Dynamic Line Rating systems for overhead transmission lines and wind generation.

Direct Benefits for Wind Generation Access

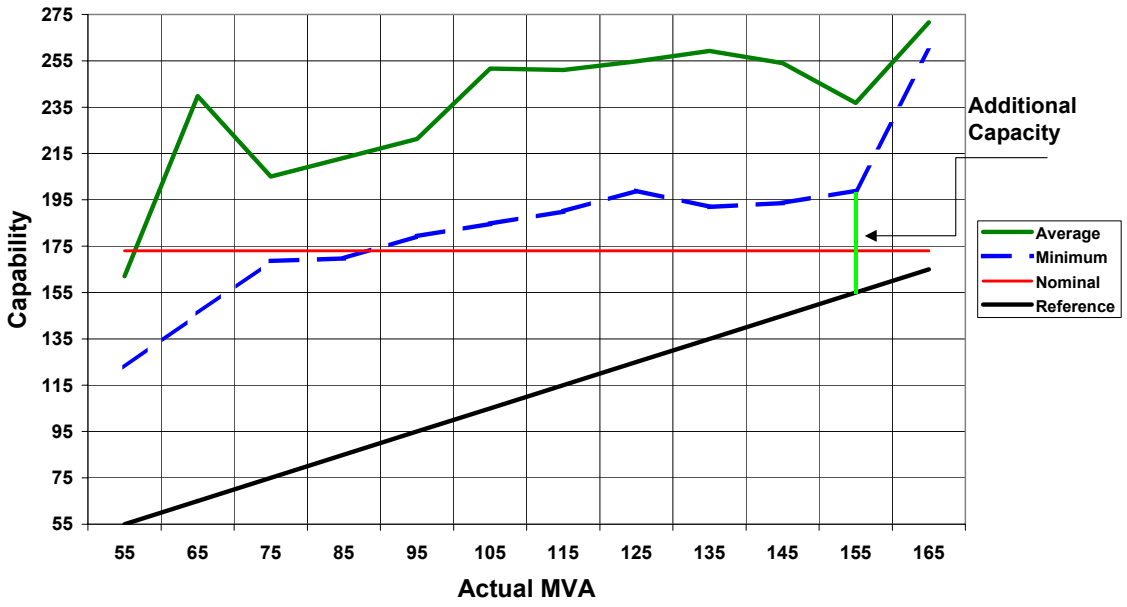
When wind generation is at its highest – at times of high winds – real time ratings of transmission lines are also at their highest. Even moderate winds produce a major effect on cooling transmission lines. An increase in wind speed from 0 ft/sec to 4 ft/sec can typically increase the current carrying capacity on a transmission line by over 30%. The fact is that just about any increase in wind speed will increase transmission line capacity much more than any change in ambient temperature. In addition, nearby lines will tend to be able to carry additional wind generated load because the wind conditions will also tend to increase the real time transfer capability of nearby transmission lines.

Wind is highly variable, especially at low speeds. It has been shown, however, that when the wind is blowing at speeds high enough to support wind generation, wind speeds over a significant distance are much higher than the traditionally conservative assumptions used to establish transmission line limits.

The graph below depicts the results of a Dynamic Line Rating system on a 138 kV line that is connected to wind generation. It shows how the line capacity increases when the power flow from wind generators increases:

The straight horizontal (red) line shows the nominal static)rating of the line, 173 MVA - the wind farm output was previously constrained to this value. The reference (black) line shows the actual line power flows recorded over the sample period. The top (green) curve is the average real time transmission line capacity, and the middle (blue dashed) curve shows the lowest observed transmission line capacity.

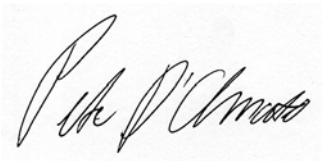
Note the vertical (bright green) line marked "Additional capacity": When the power flow is 155 MVA, the average real time capability of the line is typically 235 MVA, and the lowest real time capability observed was 197 MVA. This shows that the wind farm output limit can be safely expanded by 42 MVA, a 24% increase without any chance for curtailment. If a low amount of curtailment, e.g. 2% is allowed, the wind farm could be expanded by over 60 MVA (35%) with no threat to system reliability, and without any additional transmission line construction.



Conclusions

Dynamic Line Rating and wind generation are a perfect fit due to the nature of the application, but similar benefits can be found in traditional generation applications as well. It does not take the high wind speeds needed for wind generation to significantly increase transmission capacity. More often than not, additional capacity already exists on a typical transmission line, and real time rating is a proven means of capitalizing on that opportunity. We strongly recommend that CEC and CPUC take the time to fully understand Dynamic Line Rating technology, both its capabilities and its limitations, so as to properly consider it as one possible solution to transmission access, and how its benefits can be factored in to bid evaluations when considering transmission upgrade costs.

Sincerely,



Peter L. D'Amato
Executive Vice President
The Valley Group, Inc.

The Valley Group, Inc.
Phone: (203) 431-0262
871 Ethan Allen Hwy. #104
E-mail: info@cat-1.com
Ridgefield, CT 06877 USA
Fax: (203) 431-0296